

Claims

1. An anisotropic nanoscale structure formed from at least one element selected from groups IA and IIA of the periodic table and at least one element selected from groups IIIA, IVA, and VA.
2. A nanoscale structure as claimed in claim 1 wherein, the nanostructure is inorganic.
3. A nanoscale structure as claimed in claim 1, wherein the element of group IA is lithium, sodium or potassium.
4. A nanoscale structure as claimed in claim 3, wherein the element of Group IA is lithium.
5. A nanoscale structure as claimed in any preceding claim, wherein, the structure is a nanotube, nanorod or nanofibre.
6. A nanoscale structure as claimed in claim 5, wherein the structure is a nanotube.
7. A nanoscale structure as claimed in any of claims 1 to 6, wherein the non-metallic element selected from group IIIA, IVA, and VA is one or more of boron, carbon, silicon or nitrogen.
8. A nanoscale structure as claimed in claim 7, wherein the non-metallic element is nitrogen.
9. A nanoscale structure as claimed in any preceding claim in which some of the metallic ~~element~~ of group IA and IIA has been replaced with another element selected from ~~groups~~ and/or a transition metal.

10. A nanoscale structure as claimed in any preceding claim, wherein the nanostructure is a nanotube in which the hollow core has been filled with a metal to form a metallic nanowire.
11. A nanoscale structure as claimed in any preceding claim, wherein chemical modification of the nanostructure has been performed in order to enhance or tailor the properties of the nanostructure.
12. A nanoscale structure based on lithium nitride (Li_3N).
13. Use of a nanostructure according to any of claims 1 to 12 in an ionic conductor/battery component, a hydrogen storage device, for templating nanowires, an electrical device, catalysis, a flat display screen, or as a structural member.
14. A process for the production of a nanostructure as defined in any of claims 1 to 12, the process comprising exposing the metal of Group IA or IIA to a gaseous source of the element of Group IIIA, IVA, or VA, optionally in the presence of a transition metal, in a sealed heated chamber at a pressure between atmospheric pressure and a pressure of 10^{-4} torr, wherein the upper limit of the temperature is not more than 1200°C .
15. A process as claimed in claim 14, wherein the upper limit of the temperature is defined by the temperature of decomposition of the compound.
16. A process as claimed in claim 14 or 15, wherein lithium is heated in the presence of nitrogen in a sealed vessel until the pressure in the vessel is constant to form a lithium nitride nanostructure.